

Post – Tsunami Infrastructure and Development – Sri Lanka

INITIAL ENVIRONMENTAL EXAMINATION

Program/Project Data:

Project Location: Sri Lanka
Project Name: Post – tsunami infrastructure and development assistance to Sri Lanka
Funding Level: 35 Million US \$
Project Duration: FY 2005 to FY 2008

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Date: May 02, 2005-04-28

Environmental Action Recommended

Categorical Exclusion	()	Negative Determination	()
Positive Determination	(X)	Deferral	()

Summary of Findings:

Approval of Environmental Actions Recommended:

Clearance:

Economic Growth Team Leader:

Mission Director:

Concurrence:

Bureau Environment Officer

Approved

Disapproved:

1. BACKGROUND AND ACTIVITY DESCRIPTION

1.1 Background

On December 26, 2004, a 9.0 magnitude earthquake struck off the west coast of Sumatra, triggering a massive tsunami that killed more than 250,000 people and displacing thousands in countries around Indian Ocean. The tsunami caused extensive damage to life and property to all coastal districts along the East, Southern and West coast in Sri Lanka. This is the worst natural disaster Sri Lanka has ever faced in the recorded history.

In Sri Lanka, the December 26, 2004 tsunami left behind widespread destruction and killed over 39,000 people, destroyed over 100,000 homes, and damaged natural ecosystems, and coastal infrastructure. The percentage of the coastal population affected ranges from about 20% in the southern districts of Galle, Matara, and Hambantota to 80% in Mullativu and Ampara districts in the east.

Overall damage is estimated between \$900 - \$930 million with a large proportion of losses concentrated in the housing, tourism, fisheries, and transport sectors. Total losses across all sectors are estimated to be about 5 % of GDP. The largest share of output losses appear in the fisheries and tourism sectors due to lost income and production. Many coastal fishermen and small scale farmers' livelihoods were impacted by the tsunami, causing greater vulnerability to poverty. In addition, many people working in the informal sector who service the fisheries and tourism sectors and communities also lost their livelihoods temporarily.

Table: 1:

	Losses (million \$)	
Sector	Assets	Outputs
Housing	290-325	-
Roads	80	-
Water and Sanitation	40	-
Railways	14	-
Education	21	-
Health	57	-
Agriculture*	3	-
Fisheries*	120	155
Tourism*	250	65-130
Power	9	-
Environment	10	-
Social Welfare**	-	-
Total in \$ million	900-930	220-290
Percent of GDP	4-4.5	1-1.5

* Includes estimates from *livelihoods damage assessment* of fishermen, small farmers, and small businesses in tourism totaling \$140 million. (Source: GSL and ADB)

The United States Government provided immediate relief assistance. The USG, through USAID, plans to extend the assistance to include post – tsunami infrastructure rehabilitation and development with the objective of “build better.”

1.2 Description of Activities

The selected infrastructure includes replacement of a 500 meter bridge in Arugam Bay, reconstruction and improvement to three fishery harbours and reconstruction and improvements up to 14 damaged vocational training institutions. In the process USAID Sri Lanka proposes to include community consultations, coastal management programs in the area where infrastructure is built and to incorporate green building technologies as well as conservation and waste management techniques.

1.3 Purpose and Scope of IEE

2. COUNTRY AND ENVIRONMENTAL INFORMATION (BASELINE INFORMATION)

2.1 Locations Affected

Sri Lanka is an island in the Indian Ocean, south of India in South Asia, with geographic coordinates of 7 00 N, 81 00 E. Its total area is approximately 65,610 square kilometers (sq km, 25,332 sq mi), of which 64,740 sq km (98.7%) is land and 870 sq km (1.3%) is water. Slightly larger than West Virginia, Sri Lanka has 1,340 km (833 mi) of coastline, with maritime claims of 12 nautical miles (nm, 13.8 mi) of territorial sea, 24 nm (27.6 mi.) as its contiguous zone, 200 nm (230 mi) as its exclusive economic zone, and a continental shelf of 200 nm (230 mi) or to the edge of the continental margin. Sri Lanka has a strategic location near major Indian Ocean sea lanes. According to CIA (2005), about 13.9% of Sri Lanka consists of arable land, with 15.7% in permanent crops and 70.4% in other uses (2001). About 6,510 sq km (2,514 sq mi) was estimated to be in irrigation in 1998.

	2002	2003	Estimate 2004	Pre-Tsunami 2005
Real GDP growth	4.0	5.9	5.2	6.0
Nominal GDP (Bn. Rs.)	1,583	1,760	1,972	2,297
Nominal GDP (\$ Bn.)	16.5	18.2	19.5	20.8
Fish production (tons)	302,890	284,960	300,000	300,000
Tourist arrivals	393,171	500,642	565,000	600,000
Construction sector growth	-0.8	5.5	5.0	6.0
Inflation	9.6	6.3	7.6	10.0-11.0

Source: Central Bank of Sri Lanka.

2.2 National Environmental Policies and Procedures (of host country both for environmental assessment and pertaining to the sector)

3. EVALUATION OF ACTIVITY/PROGRAM ISSUES WITH RESPECT TO ENVIRONMENTAL IMPACT POTENTIAL

Arugam bay bridge, access road, bypass road, water sanitation and coastal area management

The existing Arugam Bay Bridge is located approximately one mile south of Pottuvil about 400 km from Colombo. The existing bridge is a steel truss bridge with a total length of 152 meter consisting of four equal spans, each 38 meters long. The bridge cross section consists of 6.7 meter clear carriageway and 0.4 meter wide sidewalk on either side. The bridge also was connected to a 550 meter long causeway and a separate single span concrete bridge on the south side. The Tsunami completely washed off the causeway on the south side leaving a gap of about 500 meters. The Tsunami also changed the width of the bay at the bridge. The width of the bay at the bridge was approximately 150 meters, but after the Tsunami, the width of the bay has increased to more than 260 meters. A temporary 4 span Bailey bridge was constructed to span over the additional 110 meter of waterway caused by the Tsunami. The temporary bridge over Arugam bay now consists of four span existing steel truss bridge connected to a four span bailey bridges for a total bridge length of 262.8 meters.

Proposed bridge: The Proposed bridge will be constructed on a new alignment and will be constructed on the east side of the existing bridge. The total length of the new bridge will be about 686 meters long. The new bridge will be about 4.5 times longer than the original 152 meter steel truss bridge. The new bridge will be providing 534 meters of additional length over the waterway. Typical section of the bridge will consist of two 3.7 meter wide lanes, and 1.5 meter sidewalk on each side. The same freeboard shall be used as the existing. The same vertical clearance shall be maintained and the vertical profile of the approaching roads and bridge will have to be adjusted to accommodate the depth of the new superstructure. The new bridge will be of concrete construction. The propose bridge will eliminate the need to repair the existing causeway which will improve and expand the wetland habitat back to it's original condition prior to the construction of the existing steel truss bridge.

The Superstructure will consist of five 1.8 meters deep Post-Tensioned concrete girder, spaced at 2.4 meters center to center spacing. Total length of the structure will be 686 m long. The bridge will consist of twenty one 32.7 m long spans. The deck will either be 200mm thick cast in place concrete crowned at the center with 2% slope, or 100mm thick pre cast deck with 100mm thick cast in place concrete topping crowned at the center with 2% slope. A 7.5 meter long approach slab should be provided at each approach of bridge to give a smooth riding surface at the road/bridge transition.

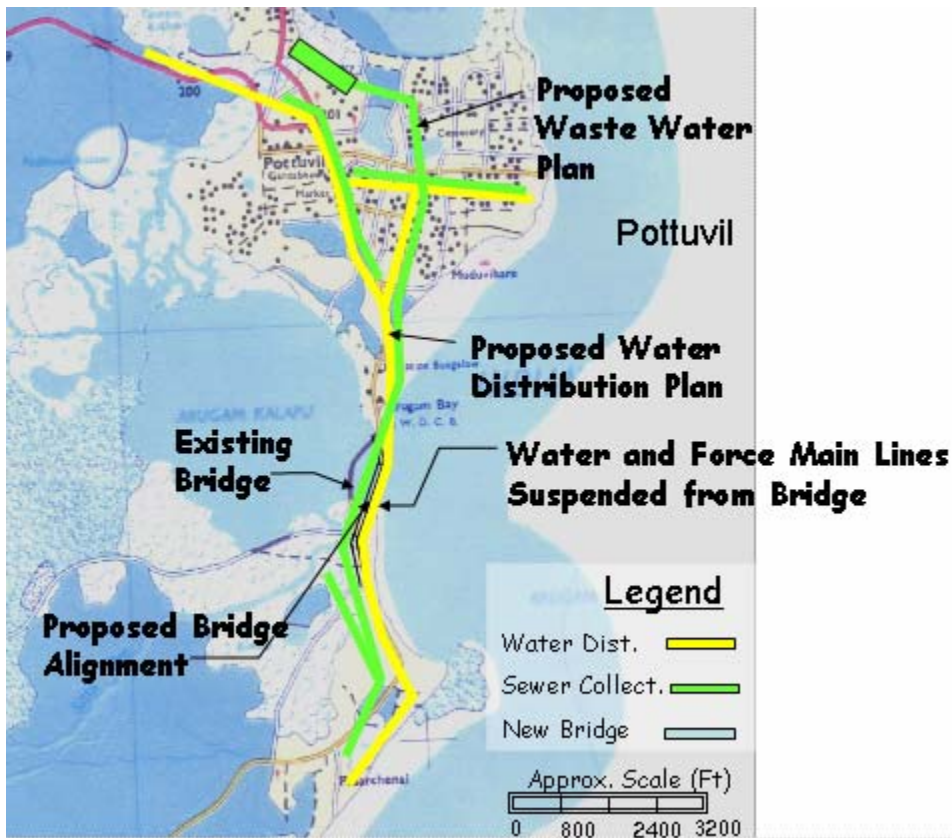
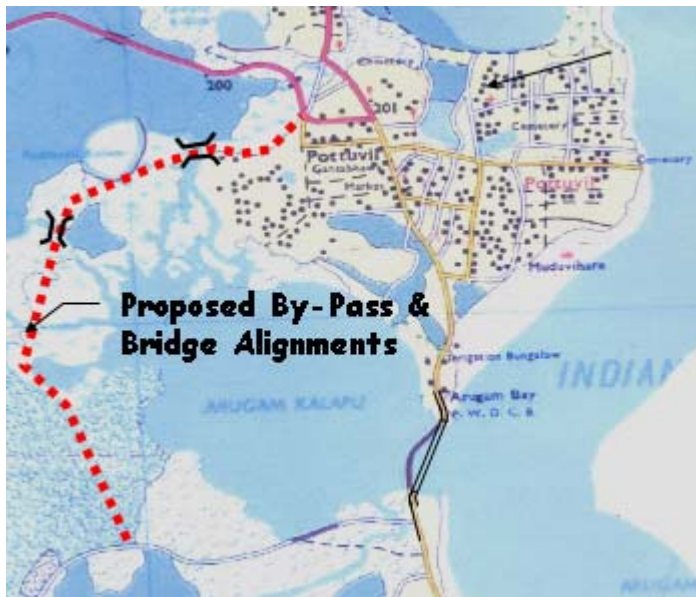
The substructure consists of twenty intermediate CIP (cast in place) bents and two CIP abutments at the ends of the bridge. The piers will utilize two 1.2 m diameter bored piles and 1.5m by 1.5m bent caps spanning between the bored piles to support the superstructure. The 1.2 m bored piles should be socketed 4 meters minimum into bedrock. The elevation of the bedrock varies between 27.4 m to 33.4 m below the Ordinary water level (OWL). The abutments will consist of Reinforced concrete retaining

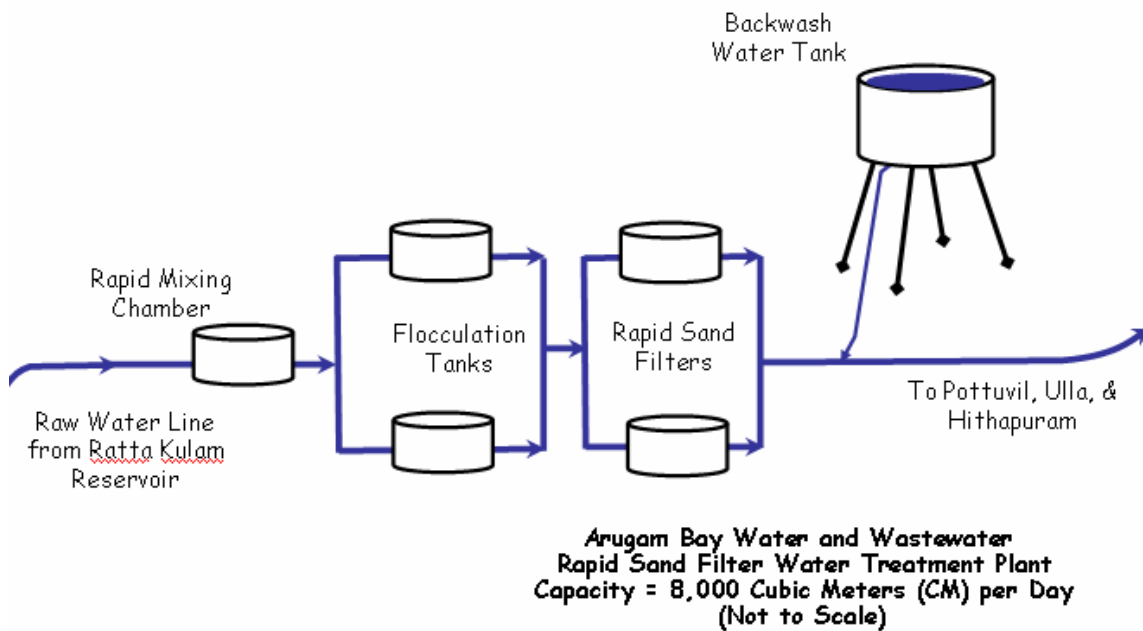
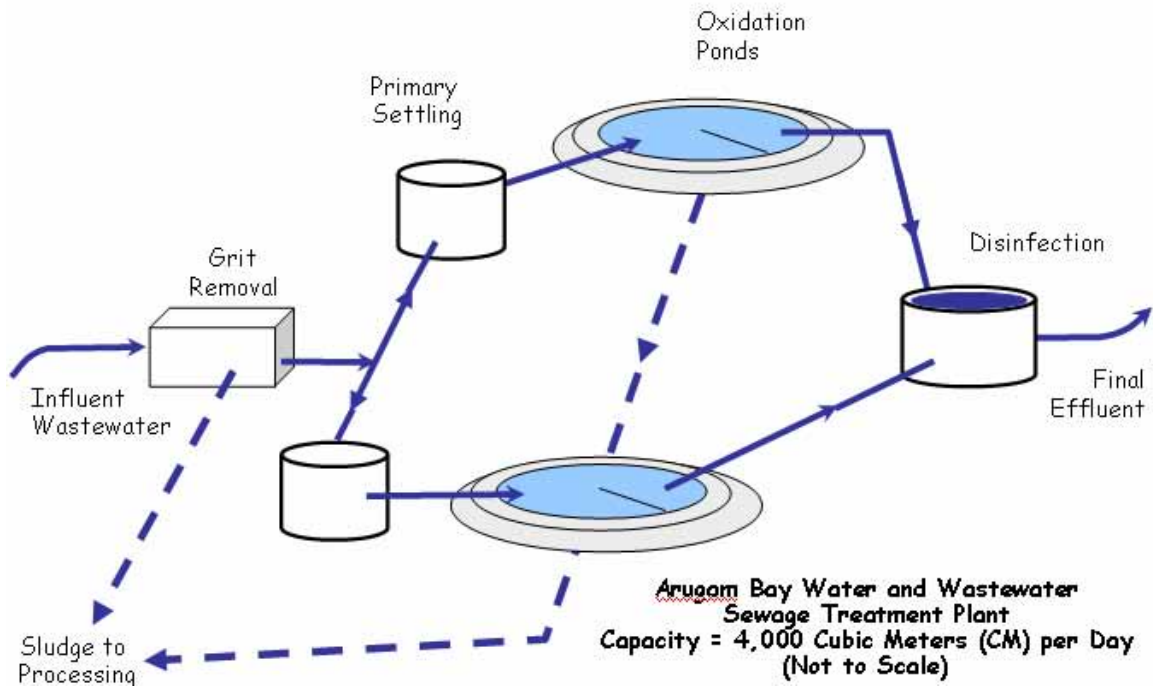
wall supported on a pile cap utilizing 0.6 m diameter bored piles. To resist a combination of forces (overturning, vertical and lateral forces), the piles at the abutment will either be staggered spacing or double row. Reinforced concrete wingwalls will be required to retain the fill behind the abutments. The wingwalls will also be concrete retaining wall supported on a pile cap utilizing 0.6 m diameter bored piles.

The new bridge will provide the following benefits and improvements:

- 1) Eliminate the need for a causeway on the south side.
- 2) More direct alignment with the existing roads on the north and south approaches.
- 3) The bridge will be 3.8 meters wider than the existing steel truss bridge to accommodate future widening of the approaching roads.
- 4) New bridge will require minimal maintenance since it will be constructed with concrete.
- 5) New bridge will be durable in salt water environment since it will be constructed with concrete.
- 6) Economy: Local construction materials and techniques have been chosen.
- 7) Environment: Restoring wetlands by eliminating causeway.







3.1.1. Implementation Plan

3.1.2. Environmental Concerns

3.1.3: Recommended Mitigation Actions and Evaluations

3.1.4: Summary and Findings

3.2 Fishery harbor reconstruction / improvement and related coastal area management

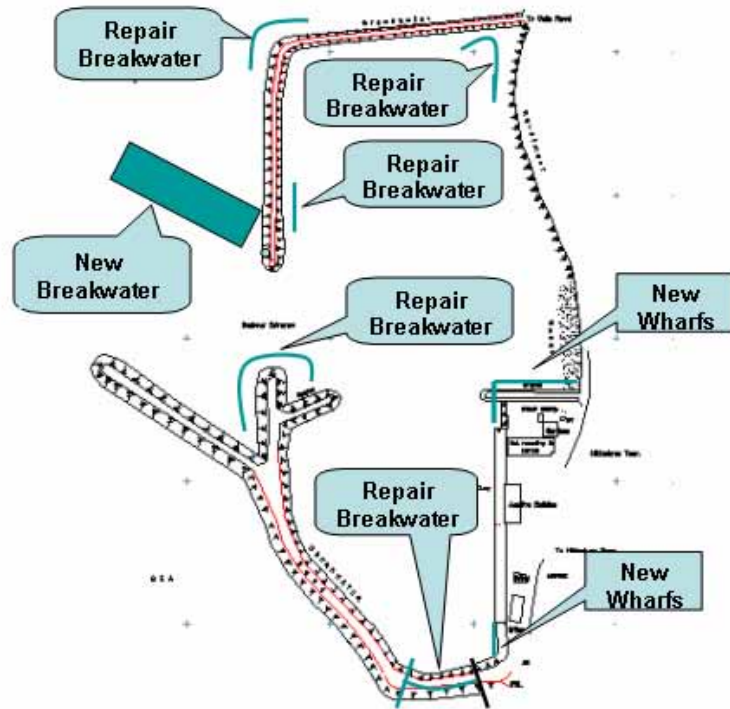
Hikkaduwa fishery Harbor

Estimated capacity of 350 boats

	Facility	Scope
a.	Breakwater	Replace breakwater
b	Breakwater	Entrance Channel
c	Breakwater	Repair
d	Wharf	Repair and 400' addition
e	Dock	2 Floating docks
f	Slipway/Dry Dock	80 ton capacity
g	Boat Motor Repair	New 20' x 70' bldg.
h	Fish Processing & Storage	Ice- Plant & Flash Freeze
i	Water Treatment	New
j	Waste Water Treatment	New
k	Fuel Station	2-8000 Gallon Tank
l	Harbor Yard Lighting	New/Repair 10 light poles
m	Administration Building	New
n	Fish Auction Facility	New 80 ' x 30'
o	Fish Waste Recycling Fac.	6 tons per day
p	Security Improvement	New Building
q	Net Mending Building	New/Repair
r	Boundy Wall	Concrete Brick Fence
s	Pavement	Repair
t	Harbor Master Quarter	New Building
u	Asst. Harbor Master Quarter	Repair
v	Community Building	New Canteen, Sales outlet, etc..
w	Toilet	Repair

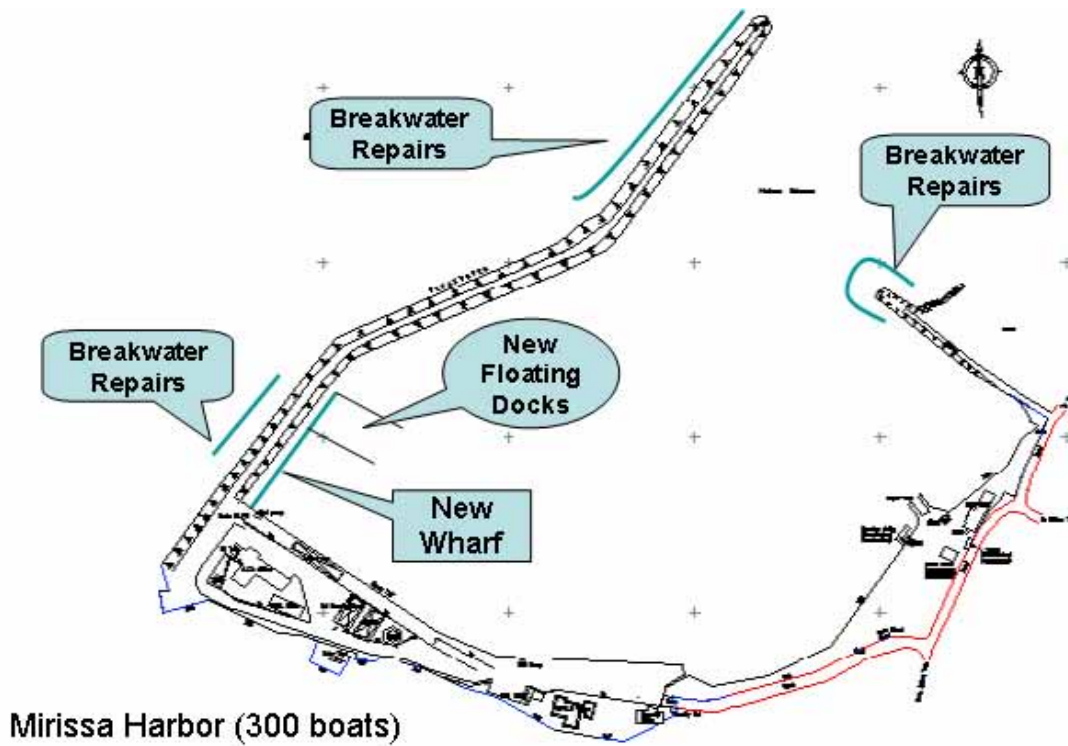
• Hikkaduwa Harbor

- New Slipway Dry dock
- Boat Motor Repair Bldg
- Fish Processing & Ice Plant, Storage, Flash Freeze
- Fuel station
- Fish Auction Bldg
- Net Mending Bldg
- Community Bldg
- Fisherman's Toilet Bldg
- Harbor Yard Lighting
- Security Guard and Gate with Boundary wall
- Fish Waste Recycling
- Water/Wastewater Treatment
- Harbor Master and Assistant Quarters



Mirissa fishery harbour (300 boat facility)

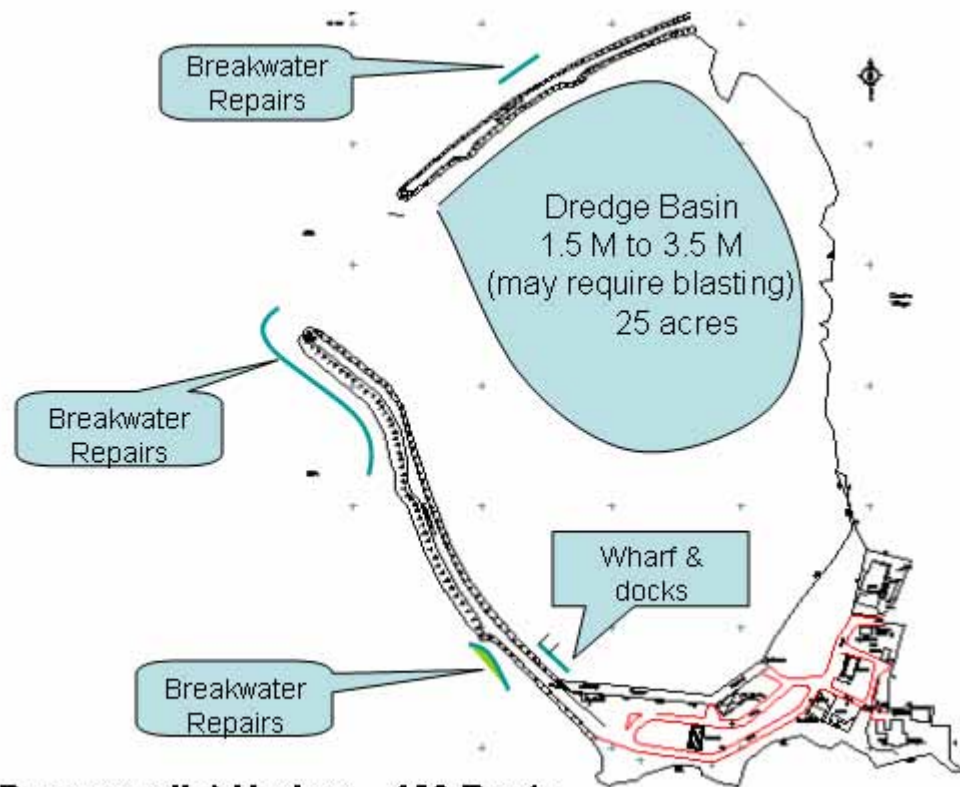
Facility		Scope
a.	Breakwater	Replace 650' breakwater
b	Revetment	Entrance Channel
c	Wharf	Repair and 450' Addition
d	Dock	200' Floating Docks
e	Slipway/Dry Dock	80 ton capacity
f	Boat Motor Repair	New 20' x 70' bldg.
g	Fish Auction Facility	40' adds to 27' x 80' Bldg.
h	Fish Processing & Storage	Ice- Plant & Flash Freeze (50T)
i	Water Treatment	New
j	Waste Water Treatment	New
k	Fuel Station	2-8000 Gallon Tank
l	Harbor Yard Lighting	New/Repair 10 Light Poles
m	Net Mending Building	New 20/ x 60' Bldgs
n	Beacon Light	Replace 2 Beacon Lights
o	Community Building	New Canteen, Sales outlet, etc..
p	Security Improvement	New Building
q	Harbor Master Quarter	New Building
r	Asst. Harbor Master Quarter	Repair
s	Boundy Wall	Concrete Brick Fence
t	Pavement	Repair
u	Toilet	Repair



Dondra fishery harbor (450 boat facility)

Facility		Scope
a.	Breakwater	Repair 750' breakwater
b	Revetment	Replace 1000'
c	Dredging/Blasting	Deepening 25 Acrs Basin
d	Wharf	New wharf for small boat
e	Wharf	Repair and 300' addition
f	Dock	2 Floating docks
g	Boat Ramp	Replace 20' x 50'
h	Slipway/Dry Dock	80 ton capacity
i	Boat Motor Repair	New 20' x 70' bldg.
j	Fish Auction Facility	Add 40' to 27' x 80'
k	Fish Processing & Storage	Ice- Plant & Flash Freeze
l	Water Treatment	New
m	Waste Water Treatment	New
n	Fuel Station	2-8000 Gallon Tank
o	Net Mending Building	Add 20' x 60' to 80' Bldg.
p	Beacon Light	Replace 2 Beacon Lights
q	Community Building	New Canteen, Sales outlet, etc..
r	Security Improvement	New Building
s	Harbor Yard Lighting	New/Repair 10 light poles
t	Harbor Master Quarter	New Building
u	Asst. Harbor Master Quarter	Repair
v	Boundy Wall	Concrete Brick Fence

w	Pavement	Repair
x	Toilet	Repair



Dondra (Puranawella) Harbor – 450 Boats

3.2.1. Implementation Plan

3.2.2. Environmental Concerns

3.2.3: Recommended Mitigation Actions and Evaluations

3.2.4: Summary and Findings

3.3 Rehabilitation of damaged vocational training facilities

	Facility	Location	Scope
a.	Training Center	Urawatta, Ambalangoda	Repair
b	Printing Center	Pettigawatte, Galle	3 Story
c	Relocation	Galle	2 Blgs
d	New Site	Galle	3 Bldgs

e	Weligama Center	Weligama	3 Bldgs
f	Ahangama	Imoduwa	3 Bldgs
g	Matara Relocation	Talalla	9 Bldgs
a	Nintava	Nintava	2 - 3 Story

3.3.1. Implementation Plan

3.3.2. Environmental Concerns

3.3.3: Recommended Mitigation Actions and Evaluations

3.3.4: Summary and Findings

3.4 Construction and expansion of vocational training facilities

Two facilities are planned in the east and south based on the results of the workforce development study by USAID Sri Lanka. These buildings will be designed to suit the type of training need (identified by the study) and include green building designs.

3.4.1. Implementation Plan

3.4.2. Environmental Concerns

3.4.3: Recommended Mitigation Actions and Evaluations

3.4.4: Summary and Findings

4. Summary of RECOMMENDED MITIGATION ACTIONS (INCLUDING MONITORING AND EVALUATION)

4.1 Summary of Recommended IEE Determinations

4.2 Summary of Mitigation, Monitoring, and Evaluation

4.3 Summary table (and summary conditions)

5. SUMMARY OF FINDINGS

5.1 Environmental Determinations

5.2 Conditions